

## **SECTION 042000**

### **UNIT MASONRY**

#### **PART 1 - GENERAL**

##### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

##### **1.2 SUMMARY**

- A. Section Features: Materials and construction for concrete unit masonry assemblies.
- B. Related Sections:

- 1. 013300 – Submittal Procedures
- 2. 014500 – Structural Testing, Inspection, and Quality Assurance
- 3. 032000 – Concrete Reinforcement
- 4. 033000 – Cast-in-Place Concrete
- 5. 051200 – Structural Steel Framing
- 6. 071900 – Water Repellents
- 7. 076200 – Sheet Metal Flashing and Trim
- 8. 079200 – Joint Sealants

##### **1.3 REFERENCE STANDARDS**

- A. The latest versions at the time of the bid document release of the publications listed below form a part of this specification; comply with the provisions of these publications except as otherwise shown or specified.
- B. The Masonry Society (TMS):
  - 1. TMS 402: Building Code Requirements for Masonry Structures
  - 2. TMS 602: Specifications for Masonry Structures
- C. American Society for Testing and Materials (ASTM):
  - 1. ASTM A307: Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rods, 60,000 psi Tensile Strength
  - 2. ASTM A615: Standard Specifications for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
  - 3. ASTM C90: Standard Specification for Load Bearing Concrete Masonry Units
  - 4. ASTM C140: Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
  - 5. ASTM C144: Standard Specification for Aggregate for Masonry Mortar
  - 6. ASTM C150: Standard Specification for Portland Cement
  - 7. ASTM C207: Standard Specification for Hydrated Lime for Masonry Purposes
  - 8. ASTM C270: Standard Specification for Mortar for Unit Masonry
  - 9. ASTM C404: Standard Specification for Aggregates for Masonry Grout
  - 10. ASTM C476: Standard Specification for Grout for Masonry
  - 11. ASTM C595: Standard Specification for Blended Hydraulic Cements
  - 12. ASTM C618: Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

- 13. ASTM C780: Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
- 14. ASTM C989: Standard Specification for Slag Cement for Use in Concrete and Mortars
- 15. ASTM C1019: Standard Test Method for Sampling and Testing Grout
- 16. ASTM C1314: Standard Test Method for Compressive Strength of Masonry Prisms
- 17. ASTM C1611: Standard Test Method for Slump Flow of Self-Consolidating Concrete
- 18. ASTM F1554: Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

D. National Concrete Masonry Association (NCMA): NCMA TEK NOTES. <http://www.ncma.org>

#### 1.4 SUBMITTALS

- A. General: Submit the following in accordance with Section 013300, "Submittal Procedures."
- B. Product data for each different masonry unit, accessory, and other manufactured product indicated.
- C. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, and reinforcing layout. Wall elevations shall be provided indicating control joint locations, connections, wall openings including MEP penetrations larger than 16 inches, embedded items, and relationship with adjacent construction. Reinforcement for bearing and shear walls shown on the structural drawings to be shown on 1/8-inch scale wall elevations.
- D. Samples for verification purposes of the following:
  - 1. Full-size units for each different exposed masonry unit required showing full range of exposed color, texture, and dimensions to be expected in completed construction.
  - 2. Accessories embedded in the masonry.
- E. Material certificates for the following signed by manufacturer and Contractor certifying that each material complies with requirements.
  - 1. Each different cement product required for mortar and grout including name of manufacturer, brand, type, and weight slips at time of delivery.
  - 2. Each type and size of joint reinforcement.
  - 3. Each type and size of anchors, ties, fasteners, and metal accessories.
  - 4. Self-consolidating grout.
- F. Mix designs and material test reports from a qualified independent testing laboratory employed and paid by Contractor indicating and interpreting test results relative to compliance of the following proposed masonry materials with requirements indicated:
  - 1. One of the following for each mortar mix:
    - a. Mix designs indicating type and proportions of ingredients in compliance with the proportion specification of ASTM C270, or
    - b. Mix designs and mortar tests performed in accordance with the property specification of ASTM C270.
  - 2. One of the following for each grout mix:
    - a. Mix designs indicating type and proportions of the ingredients according to the proportion requirements of ASTM C476, or
    - b. Mix designs and grout strength test performed in accordance with ASTM C476, or
    - c. Compressive strength tests performed in accordance with ASTM C1019, and slump flow and visual stability index (VSI) as determined by ASTM C1611/C1611M.
  - 3. Masonry units complying with property requirements of ASTM C90.

- G. Cold-weather construction procedures evidencing compliance with requirements specified in Section 1.8C of TMS 602.
- H. Hot-weather construction procedures evidencing compliance with requirements specified in Section 1.8D of TMS 602.
- I. Qualification data for firms and persons specified in Section 1.6 of TMS 602, to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, telephone numbers, names of Architects and Owners, and other information specified.
- J. Bracing drawings and calculations where required by Section 3.3E of TMS 602, sealed by an engineer licensed to perform the work in the jurisdiction where the project is being constructed, shall be submitted for record purposes.
- K. Results from tests and inspections performed by Owner's representatives will be reported promptly and in writing to Architect and Contractor.

#### 1.5 QUALITY ASSURANCE

- A. Comply with governing codes and regulations.
- B. Preconstruction Testing: A qualified independent testing laboratory shall be engaged to perform the following preconstruction testing indicated as well as other inspecting and testing services in accordance with Section 014500, "Structural Testing, Inspection, and Quality Assurance" or indicated herein for source and field quality control:
  - 1. Concrete Masonry Unit Tests: For each different concrete masonry unit indicated, units will be tested for strength, absorption, and moisture content per ASTM C140.
  - 2. Mortar properties will be tested per property specification of ASTM C270.
  - 3. Mortar composition and properties will be evaluated per ASTM C780.
  - 4. Grout properties will be tested per property specification of ASTM C476.
  - 5. Grout compressive strength will be tested per ASTM C1019.
- C. Single-Source Responsibility for Masonry Units: Obtain masonry units of uniform texture, color, and blend from a single manufacturer. In exposed work, do not use masonry units with chips, cracks, voids, discolorations, or other defects that might be visible or cause staining in the finished work.
- D. Single-Source Responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality, including color for masonry, from a single manufacturer for each cementitious component.
- E. Mock-Up: The Contractor shall identify an area that shall serve as the masonry mock-up. The mock-up shall be used to determine and establish the quality of workmanship and mix of masonry for appearance. Further masonry work shall not proceed without approval of the mock-up.
  - 1. Mock-up area shall be no less than 250 square feet in area.
  - 2. Build mockups in accordance with the drawings.
  - 3. Revise or rebuild mockups as required for conformance to details, documents, and intended aesthetic effects.
  - 4. Notify Architect one week in advance of the dates and times when mockups will be erected.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Specification Sections and as follows:
  - 1. Approximately 2 weeks prior to scheduled commencement of masonry mock-up construction and associated work, conduct conference at Project site with mason, block,

sealant, and mortar manufacturer's representatives, wall flashing/insulation installer, Owner, Architect, and engineer testing and inspection agency. Record discussions of conference, decisions and agreements reached, and furnish copy of record to each party attending.

- a. Testing and inspections required.
- b. Means and methods that will be employed.
- c. Cold weather and hot weather procedures, as applicable.
- d. Items to be addressed prior to and during the work.
- e. Protection of adjacent surfaces required.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver masonry materials to project in undamaged condition. Protect masonry materials from moisture during delivery.
- B. Store and handle masonry units off the ground, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not place until units are in an air-dried condition.
- C. Store cementitious materials off the ground, under cover, and in dry location.
- D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- E. Store masonry accessories including reinforcement, ties, and metal accessories off the ground to prevent accumulation of dirt and oil or permanent distortions.

#### 1.7 PROJECT CONDITIONS

- A. Protection of Masonry: During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
  1. Extend cover a minimum of 24 inches down all sides and hold cover securely in place. When work is resumed, clean top surfaces of loose mortar and other foreign matter.
- B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed. Remove immediately any grout, mortar, and soil that come in contact with such masonry.
  1. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
  2. Protect sills, ledges, and projections from mortar droppings.
  3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
- C. Cold-Weather Construction: Comply with Section 1.8C of TMS 602 for cold-weather construction and the following:
  1. Do not lay masonry units that are saturated, wet, or frozen from rain or snow.
  2. Remove masonry damaged by freezing conditions. Remove visible ice and snow from the top surface of existing foundations and masonry to receive new construction. Heat these surfaces above freezing using methods that do not result in damage.
  3. No masonry shall be set when air temperatures are below 40 degrees Fahrenheit without a cold-weather construction procedure in accordance with Section 1.8C of TMS 602, approved by the Engineer.

- D. Hot-Weather Construction: Comply with Section 1.8D of TMS 602 for hot-weather construction and the following:
  - 1. Remove masonry where mortar became dry before it cured.
  - 2. No masonry shall be set when air temperatures are greater than 100 degrees Fahrenheit or exceed 90 degrees Fahrenheit with a wind velocity greater than 8 miles per hour without a hot-weather construction procedure in accordance with Section 1.8D of TMS 602, approved by the Engineer.

## PART 2 - PRODUCTS

### 2.1 MATERIALS, GENERAL

- A. Comply with TMS 602 and other requirements specified in this Section applicable to each material indicated.

### 2.2 CONCRETE MASONRY UNITS

- A. General: Comply with requirements indicated below applicable to each form of concrete masonry unit required.
  - 1. Provide special shapes where indicated and as follows:
    - a. Square-edged units for outside corners.
  - 2. Size: Provide concrete masonry units complying with requirements indicated below for size that are manufactured to specified face dimensions within tolerances specified in the applicable referenced ASTM specification for concrete masonry units.
    - a. Face dimension of 7-5/8 inches or 11 5/8 inches high by 15-5/8 inches long by width required for application.
    - b. Linear Shrinkage: Shall not exceed 0.065%.
    - c. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.
    - d. Bond Pattern: Running bond.
- B. Hollow Load-Bearing Concrete Masonry Units: ASTM C90 and as follows:
  - 1. Unit Compressive Strength: Provide units with minimum average net area compressive strengths listed below or as indicated on the drawings, whichever is greater:
    - a. Bearing Walls: Minimum design compressive strength (f'm) of 2,000 psi, and minimum unit net area compressive strength of 2,000 psi.
    - b. Interior Non-Load-Bearing Partition Walls: Minimum design compressive strength (f'm) of 2,000 psi, and minimum unit net area compressive strength of 2,000 psi.
  - 2. Weight Classification: As noted on the drawings.

### 2.3 MORTAR MATERIALS FOR CONCRETE MASONRY UNIT WALLS

- A. Mortar Mix: ASTM C270, Type S, proportions per the Structural General Notes.
- B. Mortar Cement: Portland cement, ASTM C150, Type I.
- C. Mortar Aggregate: Natural color, ASTM C144.
- D. Water: Clean and fresh from public water system.
- E. Hydrated Lime: ASTM C207, Type S.
- F. Do not add admixtures, including coloring pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated. Do not use calcium chloride in mortar or grout.

## 2.4 GROUT FOR CONCRETE MASONRY UNIT WALLS

- A. Compressive Strength (fg): ASTM C1019; minimum 28-day compressive strength of grout must equal or exceed f'm, but not be less than 2,000 psi minimum.
- B. Slump: 8 to 11 inches.
- C. Grout Cement: Portland cement, ASTM C150, Type I or II.
- D. Cementitious Replacement: As permitted by ASTM C476, blended hydraulic cements meeting ASTM C595 may be used. Fly ash or pozzolans may be used as cement replacements for 15 to 40 percent of the total weight of cementitious material. Fly ash shall be class F, meeting ASTM C618 requirements. Ground granulated blast furnace slag shall meet ASTM C989 requirements. Grout with cementitious replacements shall provide minimum grout compressive strength specified at 28-day tests.
- E. Grout Aggregate: Coarse grout, ASTM C404, maximum aggregate size 3/8 inch.
- F. Grout Additives: Grout-enhancing shrinkage-compensating additive, Sika Grout Aid or approved equal.
- G. No proportioning or mixing of grout on site.
- H. Do not add admixtures, including coloring pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated. Do not use calcium chloride in mortar or grout.

## 2.5 REINFORCING STEEL

- A. General: Provide reinforcing steel complying with requirements of Section 2.4 of TMS 602 and Section 032000, "Concrete Reinforcement."
- B. Steel Reinforcing Bars: Carbon steel complying with ASTM A615, Grade 60.

## 2.6 EMBEDDED MATERIALS

- A. Bent-Bar Anchors: ASTM F1554 Grade 36 galvanized steel with Class 1A threads.
- B. Headed Anchor bolts: ASTM A307, Grade A
- C. Sheet Metal Flashing: Fabricate from the following metal complying with requirements specified in Division 7, Section 076200, "Sheet Metal Flashing and Trim."

## 2.7 MISCELLANEOUS MATERIALS

- A. Masonry Cleaners
  - 1. Proprietary Acidic Cleaner: Manufacturer's standard-strength general-purpose cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry surfaces of type indicated below without discoloring or damaging masonry surfaces and without leaving any chloride residue; expressly approved for intended use by manufacturer of masonry units being cleaned:
    - a. For masonry not subject to metallic oxidation stains, use formulation consisting of a manufacturer's standard strength blend of surface-acting acids, chelating, and wetting agents.
  - 2. Products: Subject to compliance with requirements, a product that may be used to clean unit masonry surfaces includes the following, or as approved by addenda:
    - a. "Sure Klean No. 600 Detergent," ProSoCo, Inc.

- b. "Sure Klean No. 101 Lime Solvent," ProSoCo, Inc.
  - c. "Sure Klean Vana Trol," ProSoCo, Inc.
- B. Bituminous Coating: Cold-applied asphalt mastic complying with SSPC-Paint 12 except containing no asbestos fibers.
- C. Masonry Sealer: See Section 071900, "Water Repellents," for required sealer.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other specific conditions, and other conditions affecting performance of unit masonry.
  - 1. Verify that foundations are constructed within a level alignment tolerance of +/- 1/2 inch.
  - 2. Verify that reinforcing dowels are positioned in accordance with the Project Drawings.
  - 3. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of unit masonry.
- B. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.
- C. Do not proceed until unsatisfactory conditions have been corrected.

#### **3.2 PREPARATION**

- A. Clean reinforcement and shanks of anchor rods by removing mud, oil, or other materials that will adversely affect or reduce bond at the time mortar or grout is placed. Reinforcement with rust, mill scale, or a combination of both are acceptable without cleaning or brushing provided the dimension and weights, including heights of deformations, or a cleaned sample are not less than required by the ASTM specification covering this reinforcement in this Section.
- B. Prior to placing masonry, remove laitance, loose aggregate, and anything else that would prevent mortar from bonding to the foundation.
- C. Do not wet concrete masonry units before laying. Wet cutting is permitted.
- D. Debris: Construct grout spaces free of mortar dropping, debris, loose aggregates, and any material deleterious to masonry grout.
- E. Reinforcement: Place reinforcement and ties in grouted spaces prior to grouting.
- F. Cleanouts: Provide cleanouts in the bottom course of masonry for each grout pour when the grout pour height exceeds 5.33 feet.
  - 1. Construct cleanouts so that the space to be grouted can be cleaned and inspected. In solid grouted masonry, space cleanouts horizontally a maximum of 32 inches on center.
  - 2. Construct cleanouts with an opening of sufficient size to permit removal of debris. The minimum opening dimension shall be 3 inches.
  - 3. After cleaning, close cleanouts with closures braced to resist grout pressure.

#### **3.3 INSTALLATION, GENERAL**

- A. Comply with Part 3 of TMS 602 and other requirements indicated applicable to each type of installation included in Project.

- B. In the starting course on foundations and other supporting members, construct bed joints with minimum thickness at least 1/4 inch thick but not more than:
  - 1. 1-1/4 inch thick when masonry is solid grouted and supported by a concrete foundation.
  - 2. 3/4 inch thick when the masonry is ungrouted or partially grouted.
- C. Thickness: Build multiple wythe walls to the full thickness shown. Build single-wythe walls to the actual thickness of the masonry units, using units of nominal thickness indicated.
- D. Leave openings for equipment to be installed before completion of masonry. After installation of equipment, complete masonry to match construction immediately adjacent to the opening.
- E. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Use only half-size pieces or larger. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting where possible.
- F. Design, provide, and install bracing that will assure stability of masonry during construction. Remove bracing only after permanent wall supports provided.

### 3.4 CONSTRUCTION TOLERANCES

- A. Erect masonry within the following tolerances from the specified dimensions:
  - 1. Dimension of elements:
    - a. In cross section of elevation: - 1/4 inch, + 1/2 inch.
    - b. Mortar joint thickness:
      - 1) Bed: +/- 1/8 inch.
      - 2) Head: - 1/4 inch, + 3/8 inch.
      - 3) Collar: - 1/4 inch, + 3/8 inch.
    - c. Grout space or cavity width, except for masonry walls passing framed construction: - 1/4 inch, + 3/8 inch.
  - 2. Elements:
    - a. Variation from level:
      - 1) Bed joints: +/- 1/4 inch in 10 feet, +/- 1/2 inch maximum.
      - 2) Top surface of bearing walls: +/- 1/4 inch in 10 feet, +/- 1/2 inch maximum.
    - b. Variation from plumb: +/- 1/4 inch in 10 feet, +/- 3/8 inch in 20 feet, +/- 1/2 inch maximum.
    - c. True to a line: +/- 1/4 inch in 10 feet, +/- 3/8 inch in 20 feet, +/- 1/2 inch maximum.
    - d. Alignment of columns and walls (bottom versus top):
      - 1) Bearing walls and columns: +/- 1/2 inch.
      - 2) Nonbearing walls: +/- 3/4 inch.
  - 3. Location of elements:
    - a. Indicated in plan: +/- 1/2 inch in 20 feet, +/- 3/4 inch maximum.
    - b. Indicated in elevation: +/- 1/4 inch per story, +/- 3/4 inch maximum.
  - 4. Reinforcement placement:
    - a. Walls and flexural elements: +/- 1/2 inch where distance from centerline of reinforcing bar to opposite face of masonry, d, is less than or equal to 8 inches, +/- 1 inch for d less than 24 inches but greater than 8 inches, and +/- 1 inch for d greater than 24 inches.
    - b. Vertical bars along the length of the wall: +/- 2 inches for wall segments greater than 24 inch in length, and +/- 1 inch for wall segments less than or equal to 24 inch in length.
    - c. Foundation dowels that interfere with unit webs are permitted to be bent to a maximum of 1 inch horizontally for every 6 inches of vertical height.
  - 5. If the above conditions cannot be met due to previous construction, notify the Architect/Engineer.



### 3.5 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.
- B. Lay up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.
- C. Bond Pattern: Lay masonry in running bond pattern as shown on drawings, except where otherwise indicated.
- D. Stopping and Resuming Work: In each course, rack back 1/2-unit length for one-half running bond or 1/3-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly (if required), and remove loose masonry units and mortar prior to laying fresh masonry.
- E. Remove masonry units disturbed after laying. Clean and relay in fresh mortar. Do not pound corners at jambs to fit stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar, and reset in fresh mortar.
- F. Built-In Work: As construction progresses, build-in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
  - 1. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.
  - 2. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
  - 3. Fill cores in hollow concrete masonry units with grout 3 courses (24 inches) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

### 3.6 MORTAR BEDDING AND JOINTING

- A. Lay hollow concrete masonry units as follows:
  - 1. With full mortar coverage on horizontal and vertical face shells.
  - 2. Bed webs in mortar in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.
- B. Cut joints flush for masonry walls to be concealed or to be covered by other materials, unless otherwise indicated.
- C. Mortar Joints: Make all joints of uniform thickness, approximately 3/8 inch. Take care to see that all holes, depressions, cracks, and other defects are completely filled. Work mortar with tool to smooth and uniformly profiled shape. Upon completion of the work, reinspect all joints; fill all cracks and holes; remove any loose mortar by cutting out; fill and tool to match other joints.
- D. Head Joints: Provide mortar buttering on all four edges which ensures full head joints.

### 3.7 MOVEMENT (CONTROL AND EXPANSION) JOINTS

- A. General: Install control and expansion joints in unit masonry where indicated in the contract documents. Build in related items as the masonry progresses. Reinforcement shall not cross movement joints except at floor and roof levels where shown on the drawings. Finishes shall not cross movement joints.
- B. Form control joints in concrete masonry as follows:

1. Install special shapes designed for control joints. Install bond breaker strips at joint. Keep head joints free and clear of mortar or rake joint.
- C. Build in horizontal pressure-relieving joints where indicated; construct joints by either leaving an air space or inserting nonmetallic 50 percent compressible joint filler of width required to permit installation of sealant and backer rod specified in Division 7, Section 079200, "Joint Sealants."

### 3.8 INSTALLATION OF REINFORCED UNIT MASONRY

- A. General: Install reinforced unit masonry to comply with requirements of Part 3 of TMS 602.
- B. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
  1. Place grout within 1-1/2 hour from introducing water in the mixture and prior to initial set.
  2. Grout pour height shall not exceed the maximum grout pour height listed in Table 6 of TMS 602.
  3. Grout lift height shall not exceed 12.67 feet.
    - a. Grout lift height shall not exceed 5.33 feet except where a high-lift grouting procedure in accordance with the requirements of TMS 602 Section 3.5D has been approved by the Architect and Engineer.
- C. Consolidate grout at the time of placement in accordance with the requirements of TMS 602 3.5E.
- D. Form grout keys between grout pours when the first lift is permitted to set prior to the placement of the subsequent lift.
  1. Form a grout key by terminating the grout a minimum of 1 1/2 inch below a mortar joint.
  2. Do not form grout keys within beams.
  3. At beams or lintels laid with closed bottom units, terminate the grout pour at the bottom of the beam or lintel without forming a grout key.
- E. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

### 3.9 BRACING OF MASONRY

- A. Temporary Formwork: Construct formwork and shores to support reinforced masonry elements during construction.
  1. Construct formwork to conform to shape, line, and dimensions shown. Make sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
- B. Design, provide, and install bracing that will assure stability of masonry during construction.

### 3.10 FIELD QUALITY CONTROL

- A. General: The Owner will employ a testing laboratory to perform tests and inspections or will perform inspections themselves or a combination of both.
  1. Testing and inspection or quality control as required by Section 014500, "Structural Testing, Inspection, and Quality Assurance".

- B. Inform Architect two weeks prior to installation of backer rod and sealant at expansion joints. Provide equipment, such as scaffolding with interior stairway, which will safely allow Architect and Owner's inspector to examine all vertical and horizontal expansion joints prior to sealing.

### 3.11 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units and in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints including corners, openings, and adjacent construction to provide a neat, uniform appearance, prepared for application of sealants.
- C. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
  - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  - 2. Test cleaning methods on sample wall panel; leave 1/2 panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
  - 3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
  - 4. Wet wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
  - 5. Clean concrete masonry by means of cleaning method indicated in NCMA TEK 45 applicable to type of stain present on exposed surfaces.
  - 6. Do not use pressure-washing equipment to apply water sealant coatings or to clean the masonry.
- D. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

### END OF SECTION